# A Strategy to Revitalize Environmental Health Services in the United States

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Department of Health and Human Services

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# A Strategy to Revitalize Environmental Health Services in the United States


U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

Atlanta, Georgia
July 31, 2002 Working Draft

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# PREFACE

## DEVELOPING A STRATEGY TO ENHANCE ENVIRONMENTAL HEALTH SERVICES

The process of developing this strategy required the input of a diverse group of stakeholders. They included representatives of public health and nongovernmental environmental health organizations; state, territorial, and local health agencies; tribal governments; undergraduate and graduate-level environmental health and public health academic programs; and several federal agencies. The Centers for Disease Control and Prevention's (CDC's) National Center for Environmental Health (NCEH) provided leadership and facilitated the process.

NCEH formed a center-based internal steering committee whose initial task was to identify stakeholders with an interest in and commitment to environmental health services delivery. The committee's second task was to create a series of issues papers that would address critical environmental health areas – capacity building, research, leadership, communication and marketing, work force, and strategic partners. The partners came from the public health practice community, the academic community, advocacy organizations, communities with special interests, and CDC and other federal agencies. The original list of stakeholders included approximately 150 agencies and organizations. NCEH invited 31 members to form the External Partners Work Group.

The External Partners Work Group critically reviewed the initial issues paper and provided input via E-mail correspondence and a teleconference as well as a 2-day meeting in Atlanta. The result of this work group's efforts – *A Strategy to Revitalize Environmental Health Services in the United States* – was then circulated to the larger group of stakeholders for their review. After integrating the stakeholders' comments, the committee circulated a second draft to all of the stakeholders, and additional changes to the plan were discussed and incorporated.

*A Strategy to Revitalize Environmental Health Services in the United States* should be viewed as a working document that will be modified over time. The strategy includes six goals, each of which has several objectives. The next step will be to identify resources, create a time line for accomplishing objectives, and organize, prioritize, and implement the plan's activities.

### Range of Environmental Health Services As Reported by Local Health Departments

Restaurants ♦ Sewage Disposal Systems ♦ Private Water Supply Safety ♦ Swimming Pool Inspection ♦ Groundwater Pollution Control ♦ Vector Control ♦ Environmental Emergency Response ♦ Food and Milk Control ♦ Recreational Facilities Inspections ♦ Surface Water Pollution ♦ Public Water Supply Safety ♦ Solid Waste Management ♦ Animal Control ♦ Hazardous Waste Management ♦ Indoor Air Quality ♦ Health Facilities Inspections ♦ Occupational Safety and Health ♦ Noise Pollution ♦ Radiation Control

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# TRANSMITTAL MEMORANDUM

Date: July 31, 2002

From: Richard Joseph Jackson, MD, MPH
Director, National Center for Environmental Health

Subject: A Strategy to Revitalize Environmental Health Services in the United States

We are pleased to present to you the DRAFT document entitled *A Strategy to Revitalize Environmental Health Services in the United States*. This CDC strategy is one of the NCEH deliverables for 2002 and was developed in collaboration with internal and external partners, including state and local health departments and schools of public health.

NCEH's Division of Emergency and Environmental Health Services formed a steering committee that spearheaded the process and will be responsible for developing and implementing the final strategy. The initial draft strategy was developed with participation of a 31-member External Partners Work Group that represented the environmental health and protection practice community; special populations; academia; advocacy groups; and representatives of ATSDR and other CDC centers, institutes, and offices. A total of 101 organizations reviewed the draft strategy.

There have been many accomplishments in the environmental health field over the years. Improvements in sanitation, for example, are the mainstays of environmental public health and have contributed greatly to the increase in life expectancy of the American people. However, in recent decades there has been a steady decline in the resources and capacity of public health agencies to deliver environmental health services. Now, more than ever, we are aware of the dramatic repercussions of terrorism and the need for all stakeholders to be prepared to protect the public's health and safety. Environmental health services need to be enhanced to protect the health of the American people in the 21st century.

The strategy identified in this document, along with its goals and objectives, is a starting point for rejuvenating this country's environmental health system at the federal, state, tribal, territorial, and local levels.

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# EXECUTIVE SUMMARY

***The term "environmental health services" is used throughout the document and represents those services managed by public health agencies that deal with environmental health issues. As stated by Larry Gordon, former president of the American Public Health Association, "Environmental health practitioners are involved not only in inspections, but perhaps more importantly in surveillance, warnings, permitting, grading, developing compliance schedules and variances, risk assessment, risk communication, public information, exposure evaluation, seeking injunctions and other legal remedies, embargoing, sampling for analyses, education, consultation, community networking, problem prioritization, policy development, marketing the values and benefits of environmental health, plan and design review and approval, and epidemiology. Such activities are essential to a modern, effective program." [29]***

Environmental health services and sanitation were the backbone of public health in the United States for many decades. The emergence of many new issues and threats such as *Cryptosporidium* in drinking water, hantaviruses, *Escherichia coli O157:H7*, West Nile virus... and, most recently, homeland terrorism points to a need for a well-prepared environmental health system and work force that can anticipate, recognize, and respond to these types of threats. Lack of support for state, tribal, territorial, and local environmental health programs leads to a system that is ill prepared to address these threats.

During the 1990s, a series of reports from think tanks,[1] the World Health Organization,[2] and the Centers for Disease Control and Prevention[3] (CDC) rated environmental problems among the most important health issues and global threats and ranked environmental health/sanitation accomplishments among public health's greatest accomplishments. The thirty-year increase in life expectancy from 1900 to 1998 to 76.7 years, has been related to environmental health monitoring and regulation of the water supply, effective sewage systems and food quality standards as well as to immunizations and primary preventive care.[37] It has been postulated that as a result of proper sanitation, more than 80% of human diseases have been eliminated.[3] The strong tradition of environmental and sanitary services maintained itself through the middle 1960s, when new environmental problems gathered attention: globalization of the food supply, drinking water, air and noise pollution, ionizing radiation, environmental conditions in child-care facilities, solid and hazardous waste, disease vectors, wastewater, and poor housing and institutional services.

The Department of Health and Human Services' *Report to The President and Congress*[31] estimated that in 1980 the environmental health work force was 235,000 and that 37,500 were in need of additional training in public health. The report also forecast a need for an additional 137,000 environmental health professionals, based upon an expected population growth over the next decade, and the expanded responsibilities of the environmental health work force. Twenty years later, the *Public Health Workforce: Enumeration 2000* report [27] tabulated the size of the environmental health work force at 19,431 and indicated that it was shrinking and unable to meet its responsibilities. This

statistic is supported by an analysis of the National Environmental Health Association that the number of positions in environmental health has been shrinking and that there is an inability to fill open positions with capable people.[9]

The field of environmental health has expanded over the last fifty years to cover many new responsibilities, such as external and internal air quality, childhood lead poisoning, asthma control, and hazardous chemical exposure and management. In addition, new and complex technologies have become available. With these conditions, leadership is essential to ensure that all of the priority issues are coordinated and accomplished. CDC has had a history of leadership in the field of infectious disease management, as it will with environmental health services. Leadership is essential to provide an interface among those federal agencies with an environmental health mandate and officials in state, tribal, territorial, and local programs to build enduring relationships and partnerships. This leadership will increase the likelihood that decisions made by federal officials have an optimal effect on public health and that the concerns of officials in state, tribal, territorial, and local environmental health programs are communicated to federal agencies.

The implementation of the goals, objectives, and activities described in this plan will enhance our ability to achieve the Center for Disease Control and Prevention's (CDC's) vision for the 21st century: healthy people in a healthy world – through prevention. Many of the activities described herein build upon existing or developing efforts or are in the planning stages. CDC's plan to protect people from waterborne illness "*Healthy Water: CDC's Public Health Action Plan*," presently in draft, is an excellent example of one of these activities. All of these activities will require that the stakeholders build and improve long-term, strategic partnerships and establish commitments.

Implementation of this strategy will help build capacity at all levels of government; support research to translate science into practice; foster the leadership necessary to apply the public health principles of assessment, policy development, and assurance in the field of environmental health; improve our ability to communicate and market environmental health services; establish support systems to improve the performance of the environmental health work force across the United States; and create viable and long-lasting strategic partnerships among CDC stakeholders. Each goal is an essential element of the strategic plan and includes outcome objectives, activities, and evaluation components for the new approaches.

## HIGHLIGHTS OF THE GOALS AND OBJECTIVES

*A Strategy to Revitalize Environmental Health Services in the United States* is a result of input from many stakeholders. This report should be viewed as a working document that will be modified over time. The next step is to identify resources, create a time table for accomplishing objectives, organize, prioritize, and implement the plan's activities.

The overarching goal of the strategic plan is to enhance and revitalize the system of environmental health services in order to address the broad range of issues facing states and communities. This goal includes collaborating with environmental regulatory agencies, and stresses prevention of disease and mortality.

**Goal I** (build capacity) will improve and support environmental health services at the state, tribal, territorial, and local levels. Accomplishing this goal will enhance the nation's capability to prevent and respond to

environmental health threats and will improve the practitioners' access to technology and other innovative tools.

**Goal II** (support research) will enhance environmental health services by (1) defining effective approaches to address existing and emerging needs, (2) identifying the environmental antecedents of disease outbreaks, (3) engaging community involvement, (4) encouraging innovative environmental health practices and services that stress prevention, (5) defining strategic interventions, and (6) identifying and evaluating the impact of legal decisions on environmental health services and practice.

**Goal III** (foster leadership) will enhance environmental health services by developing strong working relationships among the stakeholders in environmental health services and assist state, tribal, territorial, and local health entities and other stakeholders to improve the practice of environmental health. This goal necessitates the development of a National Environmental Health Service Corps or fellowship program to create a cadre of well-trained specialists who will become leaders at all levels of environmental health service delivery.

**Goal IV** (communicate and market) will improve communication and information sharing among environmental health agencies, communities, policy makers, and others and enhance the significance and understanding of environmental health. Achieving the goal also will define the structure of an effective system for sharing environmental public health information. This goal will be accomplished by promoting and disseminating strategies, education approaches, and models of best practices to engage communities and policy makers in discussions about environmental health issues and empower them to act.

**Goal V** (develop the work force) will promote the development of a competent and effective environmental health work force to deliver contemporary services and address emerging needs. Accomplishment of this goal will define the scope of work as well as the size, composition, performance standards, and competencies of the environmental health work force and its leadership. Furthermore, activities to accomplish this goal will outline ways to develop an environmental health work force training system by collaborating with academic institutions, practitioners, and professional organizations. Development of the National Environmental Health Service Corps or a fellowship program is also a critical component. In addition, these activities will support programs to increase the number and elevate the status of environmental health practitioners who engage in competency-driven continuing education and training. This goal is in full accordance with the CDC/ATSDR strategic plan for public health workforce development.[51]

**Goal VI** (create strategic partnerships) will foster partnerships among various agencies, organizations, and entities that influence environmental health services and practice to advance marketing, communication, research, and training-program initiatives. This also will foster communication and interaction among stakeholders, especially policy makers.

**"... this plan will enhance our ability to achieve CDC's vision for the 21st century: healthy people in a healthy world – through prevention"**

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# INTRODUCTION

## environmental health...touching everyone's life everyday

### BACKGROUND

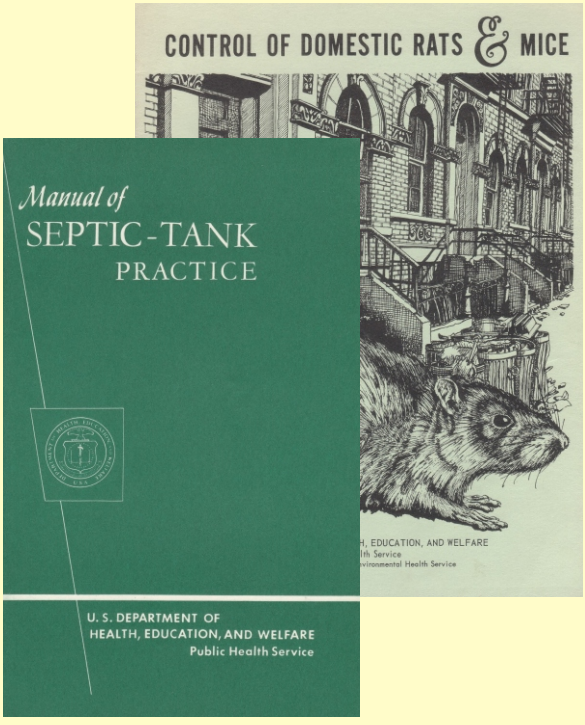
The diaries of Americans during the 17th and 18th centuries relayed the onslaught of one epidemic after another. The impact on individuals, families, communities, and the country itself was enormous. In 1793, the capital, then located in Philadelphia, had to be evacuated because of a devastating yellow fever epidemic.

In 1850, Lemuel Shattuck wrote and presented the *Report of the Sanitary Commission of Massachusetts,* which became the blueprint for our current public health system. Shattuck recommended that state and local health departments be organized to oversee sanitary inspections, communicable disease control, food sanitation, vital statistics, and primary health care services for women and children. The first laws enacted to protect health and ensure safety pertained to sanitation. Laws ensuring clean water, sewage management, and food service standards were promulgated 100 years before immunization of children became law. It has been postulated that as a result of proper sanitation, more than 80% of human diseases have been eliminated. During the 1990s, a series of reports from think tanks,[1] the World Health Organization,[2] and the Centers for Disease Control and Prevention[3] (CDC) rated environmental problems among the most important health issues and global threats and ranked environmental health/sanitation accomplishments among public health's greatest accomplishments.

The strong tradition of environmental and sanitary services maintained itself through the middle 1960s, when new environmental problems gathered attention: air and noise pollution, ionizing radiation, environmental conditions in child-care facilities, solid and hazardous waste, disease vectors, wastewater, and poor housing and institutional services. The public health system did not have the resources nor the expertise to properly handle these "new" environmental issues.

During the 1970s, CDC produced a series of environmental guidelines on subjects such as drinking water standards, recreational water safety, and rodent control to assist health departments (see Box 1). Also in the 1970s, President Richard M. Nixon created, and Congress funded, the U.S. Environmental Protection Agency by shifting critical personnel and fiscal resources from other federal health agencies. The focus of environmental health at that time, as mandated by Congress, became one that utilized a regulatory framework with an engineering base. Consequently, resources for

Box 1. Sample of CDC Environmental Guideline



Box 2. The Essential Public Health Services

**PUBLIC HEALTH IN AMERICA**

**Vision:**

*Healthy People in Healthy Communities*

**Mission:**

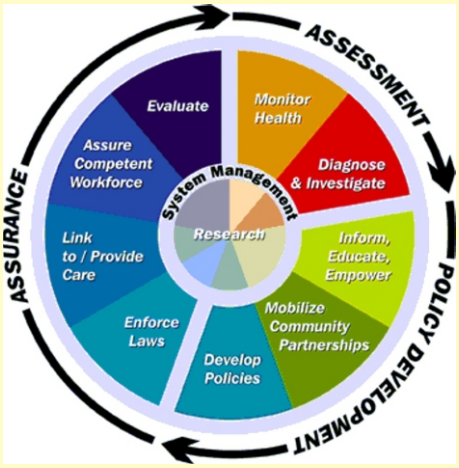
*Promote Physical and Mental Health and Prevent Disease, Injury, and Disability*

**Public Health**

- Prevents epidemics and the spread of disease
- Protects against environmental hazards
- Prevents injuries
- Promotes and encourages healthy behaviors
- Responds to disasters and assists communities in recovery
- Assures the quality and accessibility of health services

**Essential Public Health Services**

- Monitor health status to identify community health problems
- Diagnose and investigate health problems and health hazards in the community
- Inform, educate, and empower people about health issues
- Mobilize community partnerships to identify and solve health problems
- Develop policies and plans that support individual and community health efforts
- Enforce laws and regulations that protect health and ensure safety
- Link people to needed personal health services and assure the provision of health care when otherwise unavailable
- Assure a competent public health and personal health care workforce
- Evaluate effectiveness, accessibility, and quality of personal and population-based health services
- Research for new insights and innovative solutions to health problems




Adopted: Fall 1994, Source: Public Health Functions Steering Committee, Members (July 1995): American Public Health Association·Association of Schools of Public Health·Association of State and Territorial Health Officials·Environmental Council of the States·National Association of County and City Health Officials·National Association of State Alcohol and Drug Abuse Directors·National Association of State Mental Health Program Directors·Public Health Foundation·U.S. Public Health Service --*Agency for Health Care Policy and Research·Centers for Disease Control and Prevention·Food and Drug Administration·Health Resources and Services Administration·Indian Health Service·National Institutes of Health·Office of the Assistant Secretary for Health·Substance Abuse and Mental Health Services Administration*

environmental health programs based in health agencies became limited, and significant programmatic gaps resulted. The U.S. Public Health Service has estimated that although U.S. health expenditures increased by 210% between 1981 and 1993, the proportion of these expenditures used for population-based public health measures, including environmental health services, declined by 25%.[40] Also during the 1980s other topical issues and concerns gained attention for the lower level of available dollars.

In 1987, an expert committee was convened by the Institute of Medicine (IOM) to examine public health in the United States. The resulting document, *The Future of Public Health,* published in 1988,[4] outlined the dilemma facing public health throughout the nation and recommended that public health practice return to its focus on the community. The report laid out three core functions for public health practice: assessment, policy development, and assurance. The recommendations of the IOM report led to the development of partnerships among service agencies, academic institutions, businesses, and voluntary and advocacy organizations. To clarify the core functions, a set of essential services was developed that included overarching systems management and research (see Box 2). The IOM currently is undertaking a study to update the original report.[5] To assist public health practice in the effort to focus on community, a variety of assessment tools were created and field tested. This effort included the development of the *Protocol for Assessing Community Excellence in Environmental Health (PACE-EH),*[6] a tool to help public health agencies and their communities work together to assess community environmental health needs (see Box 3).

In November, 2000, the Department of Health and Human Services published the objectives for improving the nation's health,

Box 3. *Protocol for Assessing Community Excellence in Environmental Health* (PACE-EH)


*Healthy People 2010*.[7] This document stated that "various reports and evaluations have described the continuing deterioration of the national public health system: health departments are closing, technology and information systems are outmoded, emerging and drug-resistant diseases threaten to overwhelm resources, and serious training inadequacies weaken the capacity of the public health work force to address new threats and adapt to changes in the health care market." The document also stated that "all public health services depend on the presence of basic infrastructure." *Healthy People 2010* ranks the environment among the primary four factors affecting health and lists 30 objectives pertaining to environmental health, including outdoor air quality, water quality, toxics and waste, healthy homes and healthy communities, infrastructure, disease surveillance, and global environmental health. In addition, there are seven objectives for food safety and 17 objectives for occupational safety and health (see Box 4).

CDC's National Center for Environmental

HEALTHY PEOPLE 2010

## Box 4. Healthy People 2010 Environmental Health Objectives

*Healthy People 2010*—Summary of Objectives

Goal: Promote health for all through a healthy environment.

Outdoor Air Quality

8-1 Harmful air pollutants
8-2 Alternative modes of transportation
8-3 Cleaner alternative fuels
8-4 Airborne toxins

Water Quality

8-5 Safe drinking water
8-6 Waterborne disease outbreaks
8-7 Water conservation
8-8 Surface water health risks
8-9 Beach closings
8-10 Fish contamination

Toxics and Waste

8-11 Elevated blood lead levels in children
8-12 Risks posed by hazardous sites
8-13 Pesticide exposures
8-14 Toxic pollutants
8-15 Recycled municipal solid waste

Healthy Homes and Healthy Communities

8-16 Indoor allergens
8-17 Office building air quality
8-18 Homes tested for radon
8-19 Radon-resistant new home construction
8-20 School policies to protect against environmental hazards
8-21 Disaster preparedness plans and protocols
8-22 Lead-based paint testing
8-23 Substandard housing

Infrastructure and Surveillance

8-24 Exposure to pesticides
8-25 Exposure to heavy metals and other toxic chemicals
8-26 Information systems used for environmental health
8-27 Monitoring environmentally related diseases
8-28 Local agencies using surveillance data for vector control

Global Environmental Health

8-29 Global burden of disease
8-30 Water quality in the U.S.–Mexico border region

Health (NCEH) has administered environmental health programs since the early 1970s. These programs have addressed such public health concerns as radiation exposure, Agent Orange exposure in U.S. servicemen, urban rodent control, and recreational pool safety. As needs were perceived, new initiatives and programs were developed. The approach was reactive in nature and focused on responding to "hot-button" issues and congressional mandates. However, as time passed, it became evident that CDC needed to increase its ability to address an ever-expanding range of environmental health issues and concerns that affect the 55 state and territorial public health agencies, 3,215 local health departments, and approximately 700 tribal governments recognized by the United States and the individual states.[8]

There are many units of CDC that are actively involved in different aspects of environmental health. They include, the Naional Center for Infectious Diseases (NCID), and the National Center for Environmental Health's (NCEH), Divisions of Laboratory Sciences and of Environmental Hazards and Health Effects, and Office of Genetics and Disease Prevention. In addition, the National Institute for Occupational Safety and Health focuses on workplace related safety and injury issues, and the Agency for Toxic Substances and Disease Registry (ATSDR) has been involved in evaluating human risk at hazardous waste sites listed under Superfund and at "brownfields" sites. The CDC also is in the process of completing the "Health Water: CDC's Public Health Action Plan" to protect people from waterborne illness, that includes involvement of NCEH, NCID, and ATSDR. However, these activities have not focused on enhancing the delivery of day-to-day environmental health services.

In 2000, CDC established the Division of Emergency and Environmental Health Services (EEHS) within NCEH. One of EEHS's major responsibilities is to improve environmental health services in the United States. Since its formation, EEHS has awarded 17 cooperative agreements to enhance environmental health service capacity in states and communities. EEHS has also funded more than 30 smaller, project- focused activities.

The mission of EEHS is to work with environmental health stakeholders to –

- Create a proactive approach to environmental health services delivery
- Develop environmental health leadership
- Develop a competent environmental health work force
- Improve state and local health department environmental health infrastructure
- Develop a timely and relevant research agenda
- Develop methods for better communication both with partners and with communities

## WHY REVITALIZING ENVIRONMENTAL HEALTH SERVICES IS CRITICAL

There are four important reasons to revitalize environmental health services in the United States: (1) there are many environmentally-related conditions that affect the health and lives of millions of citizens and at a significant cost; (2) many emerging and re-emerging public health problems require innovative environmental health services interventions; (3) environmental health is an important part of the public health response to terrorism and other emergencies; and (4) primary environmental health services issues are becoming more complex. These reasons are expanded below and several examples are summarized in Box 5.

### 1. Environmentally related conditions

Annually, there are about 76 million cases of foodborne illness, with 325,000 hospitalizations and 5000 deaths and ailments that are getting harder to treat because of significant antibiotic resistance.[41]

Issues related to the protection of water supply are becoming more serious and complex as populations increase and with greater urbanization. In Milwaukee, Wisconsin, more than 403,000 people became ill over a two-month period in 1993 from C*ryptosporidium* oocysts that passed through the filtration system of one of the city's water treatment plants.[42] Approximately 50 people died. The primary cause was that water quality standards and testing of patients for C*ryptosporidium* were not adequate to detect the outbreak. The system that was developed to protect people became fragmented. The Safe Drinking Water Act is meant to ensure potable water for the American people. Nevertheless, approximately 22-30 million persons drink unregulated water, an unknown number drink under-regulated water[43], and

**Box 5. Examples of Environmentally Related Public Health Events**

Annually, there are about 76 million cases of foodborne illness, with 325,000 hospitalizations and 5,000 deaths and ailments that are getting harder to treat because of significant antibiotic resistance.

In one recent study, researchers discovered that 41% of wells they surveyed were contaminated and 50% of waterborne disease outbreaks were associated with individual or community water sources.

In Milwaukee, more than 403,000 people became ill as the result of drinking water that had been contaminated because the system was not prepared to remove the small oocysts of *Cryptosporidium.*

A more virulent strain of *E. coli O157:H7* has emerged causing new and more serious outbreaks of foodborne disease and has been associated with the consumption of undercooked ground beef.

In Georgia, lack of proper recreational water management and oversight led to a severe *E. coli O157:H7* outbreak in a recreational water park, leading to severe illness and the deaths of two children.

The use of antimicrobial drugs in agriculture has led to the appearance of drug-resistant strains of *Salmonella* and *Campylobacter.*

Urbanization and the increased contact between humans and animals living in previously isolated areas has led to increased rates of Lyme disease and rabies.

Pollution from a variety of sources feeding into coastal estuaries of the Southeast allowed *Pfisteria piscicida* to thrive.

*Several disease-causing hantaviruses* been associated with specific rodent hosts in the United States, thus warranting recommendations to minimize human exposure to wild rodents.

Norwalk-like virus foodborne and waterborne outbreaks are often observed in family units as well as in people located in institutions.

waterborne outbreaks have increased 50% related to water sources not covered by the Safe Drinking Water Act.

There are 14 million households in the United States that rely on domestic wells to supply their drinking water and over 90,000 new wells are drilled each year.[44] In 1993, catastrophic floods impacted the Midwestern states. A large survey of well contamination was carried out in 1994 and produced startling results: coliform bacteria were present in 41.3% of wells and *E. coli* in 11.1%; nitrate was detected in 65.4 % and atrazine (a herbicide) in 13.6%. The reasons for the contamination were poorly constructed and placed wells, which could be corrected through monitoring and education.[44]

**2. Emerging Public Health Problems**

In 1993, inadequately cooked ground beef, containing *E-coli O15:H7,* served at fast-food restaurants in Washington, Idaho, California and Nevada caused more than 500 illnesses and the deaths of four children.[45] *E-coli O157:H7* also was a cause of illness in 26 children and one death at a Georgia water park.[46]

West Nile Virus, never detected in the western hemisphere until the year 1999, sickened 55 and killed seven people in New York City. Central Park was closed on July 24, 2000, for spraying, after mosquitoes infected with West Nile virus were detected.[47]

By June 2002, there were 318 confirmed cases of hantavirus pulmonary syndrome in the United States. The primary cause was human exposure to rodents carrying the Sin Nombre virus.[48]

Front line environmental health practitioners were essential in each of the above examples, either to determine the cause of the problem, assist with remediating the environmental insult, or assist people affected by the events.

**3. Public Health Response to Terrorism and other Emergencies**

Immediately after the acute, catastrophic phase of the terrorism of September 11, 2001, in New York City, environmental health personnel were in the field doing their jobs. The first task was to coordinate with occupational health experts to assure that rescue workers were provided with proper respiratory protective equipment and to begin surveillance of rescue worker safety and health. The next step was to facilitate communication and consensus about health and safety issues among responding organizations. Environmental health personnel then surveyed all of the establishments that dealt with food service or food storage, and over a period of one week, gained access to and removed all food sources from over 750 establishments. Finally, environmental health personnel focused upon the surrounding residential neighborhoods and set over 1700 rodent bait stations and instituted a rodent monitoring system for the area. However, because of limited manpower, almost all regular environmental health protection services were temporarily suspended.[49]

From the city and state levels to the national level at CDC, environmental health personnel are charged with coordinating emergency preparedness and response activities. They are trained to respond to radiation releases, the sampling of biological contamination, decontamination procedures, and other emergency related activities.

**4. Increasing Complexity of Environmental Health Issues**

Environmental health services for the past

150 years has focused on food, water and sanitation.[3] These activities have been very successful and they have been codified into laws and regulations throughout the country. However, the field of environmental health has grown in complexity. In the 1970s evaluation of exposure to radon gas in residential structures and evaluating the environmental source of lead for poisoned children became important environmental health issues. Presently state and local environmental health programs are dealing with issues related to the environmental health management of re-emerging rodent problems,[14] confined animal feeding operations (CAFO) and their potential for animal waste spillage, as well as responsibility for defining the safety of "Brownfield" designated sites, essentially old commercial facilities with minimal hazardous materials, being converted for residential or clean commercial use.[50] Furthermore, the emergence of new infectious diseases and the re-emergence of "old diseases"[35] has prompted us to examine how environmental health will fit in the future of public health.

Much has been presented related to the lack of preparedness of the system of environmental health services to address these issues.

One critical issue is the shrinking environmental health work force within health departments. Of the 450,000 public health workers employed by federal, state, tribal, territorial, and local agencies, approximately 10% are environmental public health workers (see Box 6). As stated by the National Environmental Health Association (NEHA), "The number of positions in environmental health has been shrinking. What makes the problem even worse is that for the positions that are available, many cannot be filled with capable people."[9] In addition, the number of environmental health personnel are larger than calculated, because they are fragmented among agriculture and environmental protection units.

There also is a culture of indifference among

**Box 6. The Public Health Work Force Enumeration 2000**

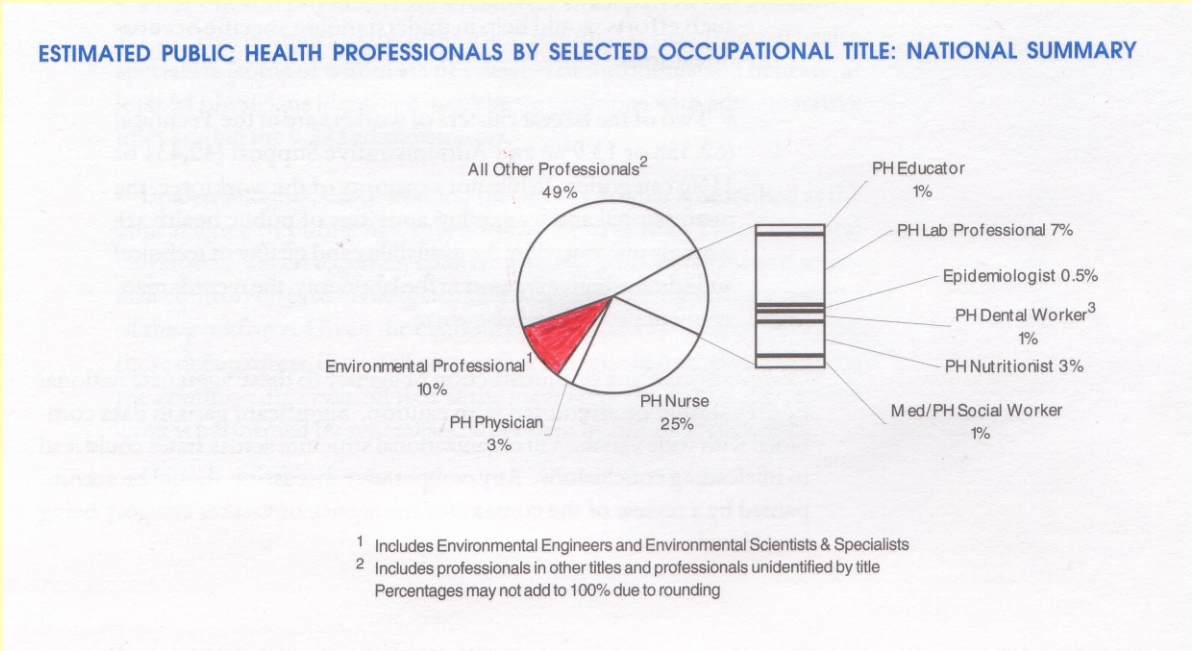



*Chart extracted from The Public Health Work Force: Enumeration 2000 from the Bureau of Health Professionals, National Center for Health Workforce Information and Analysis*

many environmental health practitioners because of low pay scales, minimal advancements opportunities, and higher compensation in the private sector. A significant portion of the environmental health workers in public health learn needed skills on the job and then move into the private sector at much higher salaries.[9] Another issue facing environmental health is that workers often enter their positions lacking communication skills and have little opportunity to learn those skills.[18] Finally, the present work force has many employees who will soon retire, making the work force shortage even more acute.

The partnership and support systems for federal, state, tribal, territorial, and local environmental health agencies and organizations need to be improved. National refocusing would assist in –

- Building capacity at all levels
- Supporting research to translate science into practice
- Fostering the leadership necessary to apply public health principles of assessment, policy development, and assurance in the field of environmental health
- Improving our ability to communicate and market environmental health services
- Supporting systems to improve the performance of the environmental health work force across the United States
- Creating viable and long-lasting strategic partnerships among all the stakeholders

The following chapters lay out the overarching goal and the six strategic goals and their related objectives and activities. Each goal includes an historical review and overview of the issues it affects.

"Environmental health is one of the most vital and rapidly expanding fields of public health. The duties have moved far beyond that of inspector or the regulator. The environmental health specialist of the 21st century needs to be on the front lines of disease prevention, using new effective tools and methods to investigate the environmental causes of disease and mortality. The September 11th attack, and the environmental health response are an example of the vital role that environmental health must play in protecting the health of America."

– Dr. Richard J. Jackson, MD, MPH
Director for the National Center
For Environmental Health

# SUMMARY OF THE GOALS AND OBJECTIVES

Success in implementing the goals and objectives described in this plan will result in CDC reaching its vision for the 21st century: healthy people in a healthy world – through prevention. Achieving these goals and objectives will necessitate long-term, strategic partnerships, and a sustained commitment by all stakeholders.

## Goal I: Build Capacity

**Strengthen and support environmental health services at the state, tribal, territorial, and local levels**

**Objectives:**

A. Expand the nation's capacity to anticipate, recognize, and respond to environmental health threats and improve access to technology.
B. Support, evaluate, and disseminate the results of new demonstration programs, best practices, and CDC-supported projects designed to improve livability and prevent and control environmentally related illness.
C. Identify the range of activities, interventions, and resources available for delivering environmental health programs in the United States, and maintain a continuous assessment process.

## Goal II: Support Research

**Support research to define effective approaches to enhance environmental health services**

**Objectives:**

A. Identify environmental antecedents to disease outbreaks.
B. Engage community support for community-based environmental health research.
C. Synthesize and disseminate relevant environmental health services research findings.
D. Implement environmental health service demonstrations and evaluations in the built and natural environments that lead to healthier communities.

## Goal III: Foster Leadership

**Foster strong leadership to enhance environmental health services**

**Objective:**

A. Provide guidance, training, and assistance to state, territorial, and local health departments; tribal governments; and other stakeholders to specifically build and enhance leadership capabilities.

## Goal IV: Communicate and Market

**Improve communication and information sharing among environmental health agencies, communities, strategic partners, and other stakeholders and better market environmental health services to policymakers and the public**

**Objectives:**

A. Identify and promote community-based strategies to elevate the image, importance, and need to improve environmental health services.
B. Support educational approaches and models of best practices to gain community support and participation in addressing environmental health service issues, concerns, and best models to organize, deliver and market them.

## Goal V: Develop the Work Force

**Promote the development of a competent and effective environmental health services work force**

**Objective:**

A. Provide support to develop the environmental health service work force through enumeration, performance standards, training, recruitment and retention activities.

## Goal VI: Create Strategic Partnerships

**Foster interactions among agencies, organizations, and interests that influence environmental health services.**

**Objective:**

A. Coordinate and promote activities that identify critical stakeholders and foster communications and interactions among agencies, organizations, and interests that influence environmental health services.

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# CDC's PLAN:

*A Strategy to*

*Revitalize*

*Environmental*

*Health Services*

*in the*

*United States*

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# GOALS, OBJECTIVES, AND ACTIVITIES

## Overarching Goal

Enhance and revitalize environmental health services to address the broad range of issues facing the nation

This overarching goal is based upon the following environmental health generalizations that affect state, tribal, territorial, and local public health agencies:

There is an insufficient number of practitioners as well as an insufficient number of properly trained environmental health specialists.

In the public sector, environmental health personnel are significantly underpaid compared with their counterparts in the private sector, leading to many vacant positions and high turnover rates.

Service delivery techniques are often outdated. Many employees in the environmental health work force do not fully benefit from available technology and information management.

The "Essential Public Health Services" (see Box 2) and a health outcomes analysis approach have had minimal effect on environmental health practice and the delivery of environmental health services.

Substandard housing, school buildings, and day-care facilities pose potential risks to health (e.g., childhood lead poisoning, pesticide exposure, asthma, mold exposure) and have received little attention from environmental health programs.

The demand for expanded environmental health services and the appearance of new and emerging threats are diluting service delivery.

More stakeholders need to be engaged in the process of delivering environmental health services at the community level.

A number of stakeholders are working diligently to revitalize various aspects of their environmental health services programs. Following are examples of some innovative programs.

The Philadelphia Department of Health decreased the number of inspections it conducted by training staff in food-service establishments to function as food-safety managers. The health department now serves more of an assurance function than a service-delivery function.

The Columbus (Ohio) Department of Health transformed its environmental unit into an assurance/assessment unit that works with several city agencies to tackle a variety of health problems. One multiagency program that is highly successful helps relocate those people who are at health risk because of inadequate or condemned housing to safe and livable housing.

The Albuquerque Environmental Health Department instituted a community-focused environmental assessment program that defines the appropriate collaborative activities to address health issues.

At the request of the tribal chairman of a reservation in the upper Midwest, CDC helped assess and develop strategies to correct potential problems associated with mold in housing.

The State of South Carolina established a statewide environmental risk assessment unit to evaluate chemical exposure and potential adverse health effects.

The Sacramento County (California) Department of Environmental Health combined the environmental health and environmental protection functions into an integrated, health-focused unit to improve service delivery.

"The time is always right to do what is right."
*–Martin Luther King Jr.*

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# GOAL I. BUILD CAPACITY

Strengthen and support environmental health services at the state, tribal, territorial, and local levels

"In its broadest sense, environmental health comprises those aspects of human health, disease, and injury that are determined or influenced by factors in the environment. This includes the study of both the direct pathological effects of various chemical, physical, and biological agents as well as the effects on health of the broad physical and social environment, which includes housing, urban development, land use and transportation, industry, and agriculture."

*–Healthy People 2010*

Health is a concern of all sectors of the society–public and private–and the responsibility of each individual. The assurance of a healthy society is the work of many agencies and organizations: public, private, for-profit and nonprofit, businesses, and advocacy groups, all weaving together their contributions into a cloth called "health." The discussion on capacity building focuses on protection of the community as a whole as well as individual citizens.

The public health system in the United States comprises organized federal agencies, state departments of health, tribal and territorial health units, and the 3,215 local public health agencies. The legal mandate to ensure the health of our citizens is carried out, in most instances, at the local level. However, the interaction between state and local health departments varies. Fifteen states operate under a centralized system, where local health departments are directly operated by the state or the state provides all public health services. Twenty-six states operate under a decentralized system, where local health departments are formed and operated by the local government. Two states operate a shared system, where the state has health officer selection and budget review responsibility. Nine states operate in a centralized/decentralized mode, where the state provides services in areas that have no local health department.[10] Finally, there are thousands of environmental health programs that are not assigned to health departments but that carry out significant public education campaigns, community-based programs, and control activities (e.g., environmental regulatory agencies, licensing and fees departments).

The vast majority of state health departments have environmental health units of some sort. These state environmental health units generally transmit funds from the federal and state levels to local health departments, collect environmental tracking data, and operate statewide programs, e.g., emergency medical services; toxic agent risk assessments; emergency preparedness, response, and recovery; and childhood lead poisoning prevention. For many communities, local environmental health services programs include drinking water protection, food-service inspections, on-site

wastewater management, permitting, and inspection, and vector and animal control. In many larger communities, local environmental health services programs parallel state environmental health services programs. There is no unified set of environmental health services for state and local health departments. In some states and municipalities, multiple agencies deal with environmental health issues, such as local air pollution, water and sewage, emergency management, and social services.

A variety of frameworks exist involving state health departments and their environmental protection counterparts. For example, environmental protection units carry out the regulatory mandates of the U.S. Environmental Protection Agency (EPA). Most state health departments only interact with their environmental protection counterparts when a crisis arises. In some states (e.g., South Carolina), a single state agency is responsible for all health and regulatory issues. Other states (e.g., Georgia) have a separate health department and environmental protection division. And some local health departments have distinguished between health and environment (e.g., Chicago).

Tribal governments have unique needs that are defined under the Federal Trust Document, whereby the federal government has assumed the obligation of protecting Indian land and people.[11]

In addition, the field of public health is changing. Many health agencies are moving away from service delivery to operating via the core functions of assurance, policy development, and assessment. Essential to this systems-management approach is strategic problem solving. Unfortunately, many environmental health service programs continue to carry out their mandates in a very traditional "stovepipe" manner. As examples, the measure of productivity in a food-service program may be the number of inspections; for septic-system inspections, it may be the number of septic tank system permits, inspections, or land evaluations instead of measurement of improvements in community health outcomes.

The public health field needs to move in the direction of evaluating the effect of environmental health services on health. This action would shift the focus of food safety inspections from the number of establishments inspected to disease tracking at health care facilities. Eliciting the number and types of foodborne illnesses occurring in a community would lead to defining the most effective methods for preventing disease.

Following are the objectives and their corresponding activities to accomplish the goal of strengthening and supporting environmental health services at the state, tribal, territorial, and local levels.

**Objective I-A: Expand the nation's capacity to anticipate, recognize, and respond to environmental health threats and improve access to technology.**

Activity I-A-1: Increase the number of capacity-building and demonstration cooperative-agreement programs.

Activity I-A-2: Create and maintain a contact list of all state, territorial, local, and tribal environmental health service units (e.g., agencies, departments, divisions, programs, etc.).

Activity I-A-3: Provide guidance, training, consultation, and technical assistance to state, tribal, territorial, and local agencies.

Activity I-A-4: Evaluate and periodically distribute information about new and effective technologies and tools.

Activity I-A-5: Support efforts by environmental health programs to train personnel in the use of new technologies.

**Objective I-B: Support, evaluate, and disseminate the results of new demonstration programs, best practices, and CDC-supported projects designed to improve livability and prevent and control environmentally related illness.**

Activity I-B-1: Evaluate currently funded environmental health service projects[12-14] and disseminate results to strategic partners and other stakeholders, as appropriate.

Activity I-B-2: Support the development of science-based strategies for state and local public health agencies to improve health and well-being through improved land-use decisions.

Activity I-B-3: Promote institutional/strategic changes to foster ongoing coordinated efforts with strategic partners (e.g., Department of Housing and Urban Development, EPA, state and local health departments, etc.) and other stakeholders to implement and evaluate environmental interventions to improve health and well-being for urban residents.

**Objective I-C: Identify the range of activities, interventions, and resources available for delivering environmental health programs in the United States, and maintain a continuous assessment process.**

Activity I-C: Conduct ongoing environmental health capacity needs assessments, as part of the mandated assessment of public health needs by Public Law 106-505, Public Health Threats and Emergencies Act (Frist-Kennedy Bill).


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# GOAL II. SUPPORT RESEARCH

Support research to define effective approaches to enhance environmental health services

Environmental health services cover a broad range of activities, including food establishment inspection, working with developers to assure proper design and management of on-site wastewater disposal systems, environmental analysis for sources of childhood lead poisoning, "sick building syndrome" analysis and control, mosquito and other vector control, issuing fish and shellfish advisories based on contamination levels, and control and management of exposure to hazardous substances – just to name a few. The field of environmental health and the breadth of problems related to it require an expanded research agenda to better understand the relationship among the environment, livability, and incidence of disease. This understanding is essential to improve prevention approaches. Annually, there are 76 million cases of foodborne illness, with approximately 325,000 hospitalizations and 5,000 deaths.

A recent study of approximately 5,000 private water wells in the United States showed coliform contamination in 42% of the wells. Fifty percent of waterborne disease outbreaks are associated with individual or noncommunity water sources, and individual wells serve nearly 15% of the United States population. [52] Compounding the problem in some areas is the rapid growth of on-site waste disposal systems. In a large suburban Atlanta county, more than 80,000 on-site waste disposal systems are in place, with 3,000 to 4,000 systems being added each year. According to the United States census, approximately 26% of Florida's population was served by onsite sewage treatment and disposal systems. Approximately 1.8 million systems were estimated to be in use statewide, discharging 450 million gallons of partially treated, nondisinfected wastewater to the environment each day. Approximately 40,000 new systems have been installed each year.[15]

Many health issues are environmentally related, such as *Cryptosporidium* in water, *E. coli O157:H7* in food, outdoor air quality, mold, and insect infestation. In addition, there are significant indoor air-quality problems linked to "sick-building syndrome" in the work place and in schools. Likewise, significant problems are associated with recreational water, rodent infestation and the spread of hantaviruses, and childhood lead poisoning. Lead exposure, primarily from lead-based paint and dust in older housing, translates into approximately 500,000 to 600,000 children in the United States younger than 6 years of age having elevated blood lead levels.[53] To address these and other issues, CDC needs to expand its

intramural and extramural research agenda. Priority research areas include the following:

**Developing alternative sewage disposal systems** Since many of the best lots to build residential and commercial structures have already been developed, builders have resorted to building on lots with poor soils and inadequate drainage, leading to contamination of adjacent properties and local waterways. Evaluations of alternative wastewater management systems need to be communicated to public health practitioners. New systems should be evaluated and research conducted to identify new and more effective approaches to wastewater management.

**Modifying urban environments** Urban sprawl and excessive commuting traffic are affecting the health of our communities. For example, nitrous oxide, sulfur dioxide, and formaldehyde in the air primarily come from vehicle exhaust. Research is needed to establish the parameters of their effect on land-use decisions and community design on health. Innovative approaches to manage this and other problems that have an environmental health impact need to be explored, evaluated, and implemented.

**Monitoring wells** Floods in the Midwest and South during the mid-1990s demonstrated severe deficiencies in well-water safety and integrity. A multi-state study of 5000 wells conducted in 1994 revealed that 41% were contaminated with coliform bacteria, 11% were contaminated with E-coli and 61% were contaminated with nitrates. In subsequent evaluations of proper well construction and sealing, nearly 80% were found to be deficient.[44] Public water supplies and distribution systems generally found in urban settings are often outdated. Research could establish the acceptable parameters for well construction and maintenance and demonstrate the efficiency and safety of recommended approaches.

**Defining the environmental antecedents of disease outbreaks** There is no national tracking system in place that correlates disease outbreaks with their environmental antecedents, especially as it relates to food-service establishments, water and sewage systems, and mold and vectorborne diseases. A scientific environmental basis for ongoing environmental epidemiologic tracking and monitoring needs to be established, and cost-effective antecedent monitoring systems need to be designed, field tested, and put in place.

**Defining the structure and size of the environmental health work force** When evaluating the work force, there is a real need to ascertain the current level of competence, methods of training, the impact of training efforts, the impact of the "essential services" approach to environmental health, the relations between competencies and practices as they pertain to community-based needs, the information that reaches the environmental health work force, and the type of impact of work force-directed activities on the level of competence and job performance.

**Identifying and disseminating model environmental health statutes, administrative rules and local ordinances** CDC and the Agency for Toxic Substances and Disease Registry currently are partners with Johns Hopkins University School of Public Health and Georgetown University School of Law on the Public Health Law Project. Information drawn from that project could be shared with environmental health programs across the country, and gaps in information could be brought to the project's attention.

Following are the objectives and their corresponding activities to accomplish the goal of supporting research to define effective approaches to enhance environmental health services.

### Objective II-A: Identify environmental antecedents to all disease outbreaks.

Activity II-A-1: Determine and support the research required to identify and define the environmental antecedents of disease outbreaks.

Activity II-A-2: Disseminate relevant research findings to strategic partners and other stakeholders, and assist with their interpretation.

### Objective II-C: Synthesize and disseminate relevant environmental health services research findings.

Activity II-C-1: Develop and distribute to strategic partners and other stakeholders a list of environmental health research projects conducted by agencies, academic institutions, industries, and others.

Activity II-C-2: Develop "best practices" guidance documents based on current research in various areas of environmental health service and practice.

### Objective II-B: Engage community support for community-based environmental health research.

Activity II-B-I: Define and evaluate a process to elicit community involvement in environmental health research.

Activity II-B-2: Promote the use of the *Protocol for Assessing Community Excellence in Environmental Health* (PACE-EH) among stakeholders (e.g., State, tribal, territorial, and local entities).

### Objective II-D: Implement environmental health service demonstrations and evaluations in the built and natural environments that lead to healthier communities.

Activity II-D-1: Support demonstration projects that describe strategic interventions designed to improve community health.

Activity II-D-2: Evaluate best practices and gaps related to laws, ordinances, and regulations that affect environmental health service delivery and practice.

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# GOAL III. FOSTER LEADERSHIP

Foster strong leadership to enhance environmental health services

Leadership in public health comes from the federal, tribal, territorial, state and local public health work force; communities; academic institutions; affiliated organizations; advocacy and volunteer organizations; and business and commerce. William Keck, a health officer from Akron, Ohio, wrote in 1992 in the *American Journal of Public Health* that "Effective public health agencies of the future will be all of the following: facilitators for strong and meaningful community participation in the assessment and prioritization of community health problems, major participants in public policy decision making, and leaders focused on health outcomes as the measure of the impact of intervention."[16] This statement also holds true for the field of environmental health.

Under the umbrella of leadership, the American Public Health Association published *Healthy Communities 2000: Model Standards*[17] as a guideline for community attainment of national health objectives. The document elaborated on 18 model standards and goals for environmental health: air quality, food protection, noise control, radiological health, sanitation in various facilities (general, child care, mobile home parks, public buildings, recreational areas, schools), solid waste management, toxic and hazardous substances, vector and animal control, wastewater management, safe drinking water, housing services, institutional services, and community monitoring.

The Institute of Medicine report, *The Future of Public Health,* reaffirmed that local public health agencies are "the final delivery point for all public health efforts" and called for "policy development and leadership that foster local involvement and a sense of ownership, that emphasize local needs, and that advocate equitable distribution of public resources and complementary private activities commensurate with community needs."[4] Across the country, the list of programs under the domain of environmental health has expanded and, although the list varies from state to state, it may include toxic chemical exposure; emergency medical services; 911 systems; trauma systems; injury

"Today the need for leaders is too great to leave their emergence to chance"

— *Institute of Medicine, 1988*

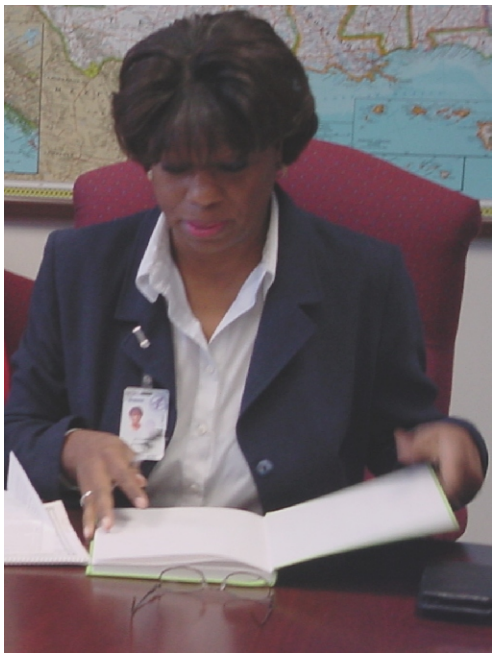
— *Accredited environmental health academic programs*

"Leadership should be born out of the understanding of the needs of those who would be affected by it." –Marian Anderson

control and prevention; tattoo and body piercing safety; sick building syndrome; substandard housing; assurance of compliance with the Americans with Disabilities Act; preparation, response, and recovery related to natural disasters; unintentional events and terrorist acts; and nuisance complaints.

Until very recently, public health with its environmental health services units and partners were not at the table when federal, state, and local emergency-response agencies interacted to coordinate appropriate responses to emergency situations. As urban sprawl uses up quality land for residential and commercial buildings, there has been pressure to construct septic systems on marginally acceptable land and on smaller lots. Although local boards of health often meet to discuss land use issues, little effort has been made to develop new and innovative policies that affect land use.

State public health agencies and their environmental regulatory agency counterparts are responsible for establishing statewide health objectives, delegating power to local agencies, and holding them accountable. Based on the *Future of Public Health* report, states are vested with responsibility for "support of local service capacity, especially when disparities in local ability to raise revenue and/or administer programs require subsidies, technical assistance, or direct action by the state to achieve adequate service levels." [4] State public health agencies, including their environmental health components and other state environmental agencies, are in the pivotal position of receiving, dispersing, and accounting for federal environmental health resources.



*Dr. Sharunda Buchanan, Chief, Environmental Health Services at CDC*

As an example, the National Association of County and City Health Officials (NACCHO) completed the Environmental Health Priorities Project.[18] The results of the project are based on an analysis of focus-group responses, key informant interviews with environmental health leaders, and discussions with its Environmental Health and Prevention Advisory Committee. The resulting document provides recommendations covering five broad thematic categories: national leadership, work force development, integration, promotion, and funding. The NACCHO document states that "future issues for local environmental health included (1) uncontrolled growth; (2) reemergence of traditional environmental health concerns; (3) deteriorating public health infrastructure; (4) the impacts of an aging population; (5) changes due to better understanding of the humane genome; and (6) a lack of long-term planning, vision and concern." [18] The recommendations offer action options that can be taken by CDC, the Agency For Toxic Substances and Disease Registry, NACCHO, and others to enhance the future of environmental health services and practice.

*America's Environmental Health Gap*, a Pew Environmental Health Commission report, challenges the nation to deal with the role of the environment and the antecedents of disease. The report states that "there is a national leadership void, resulting in little or no coordination of environmental health activities. As a result, public health prevention efforts are fragmented and too often ineffective in reducing chronic and disabling diseases and conditions." [19] The Pew Environmental Health Commission proposed a nationwide health tracking network to "identify populations at risk and respond to outbreaks, clusters and emerging threats; establish the relationship between environmental hazards and disease; guide intervention and prevention strategies, including lifestyle improvements; identify, reduce and prevent harmful environmental risks; improve the public health basis for policymaking; enable the public's right to know about health and the environment; and track progress towards achieving a healthier nation and environment." [19] The U.S. Congress requested that CDC develop a plan for a coordinated environmental public health tracking network among all states to identify and track chronic diseases and their relation to environmental factors. This request for tracking reinforces the concept that classical epidemiologic tools, which can be traced back to John Snow's work during the cholera epidemics of the 1850s, need to be linked with a comprehensive national biomonitoring system.

The National Environmental Health Association has produced a set of competencies for the environmental health work force. These competencies define the knowledge, attitudes and behaviors required by environmental health practitioners to carry out their jobs effectively. These competencies will be coordinated with the process presently underway to produce a set of environmental health services performance standards.

NACCHO and its partners produced and disseminated the *Protocol for Assessing Community Excellence in Environmental Health (PACE-EH),* [20] which is a tool to assist a community in evaluating its environmental health issues and priorities, and involves the assistance of the environmental health unit in its analysis. PACE-EH has been field-tested by communities with effective local environmental health department leadership.

CDC's Division of Emergency and Environmental Health Services (EEHS) is a leader in establishing national policy, in creating a framework for debate, and in setting national health goals and standards for achievement. CDC presently funds twelve major environmental health projects with state and local health departments and schools of public health. To maintain its leadership role, CDC needs to expand its funding and technical assistance to support state, tribal, territorial, and local agencies and organizations in their efforts to address contemporary, new, and emerging environmental issues and threats.

The American Public Health Association, the Association of State and Territorial Health Officials, NACCHO, the National Association of Local Boards of Health, and the Public

To improve the practice of environmental health services, CDC established the Environmental Health Specialist Network (EHS-Net). It is a network of environmental health specialists working closely with epidemiologists, is a new project created to facilitate the exchange of information and ideas between epidemiologists and environmental health specialists. One strength of this project will be the generation of new ideas that results from bringing together experts from epidemiology, laboratory, and food protection programs. It is anticipated that this project will facilitate the development of efficient and effective foodborne disease prevention strategies.

Health Foundation are completing a project that will lay out a comprehensive set of public health performance standards based upon the delivery of the "Essential Public Health Services" (see Box 2). Implementation will require that guidelines and standards be developed, that the work force be better trained, and that technical assistance be provided.

There also is a need to create a core of leaders in environmental health at the federal, state, tribal, territorial, and local levels. CDC has proposed the creation of an Environmental Health Services Corps or a fellowship program as well as an Environmental Leadership Institute to accomplish this mission. Participants would come from federal, state, territorial, and local health departments and agencies and from tribal governments. They would receive specialized training and applied experiences in environmental health program management. It is expected that these new leaders in environmental health services would return to their work places and communities with the tools to institute change utilizing the ten essential services as a framework for a new organizational approach to the delivery of environmental health services.

Following is the objective and its corresponding activities to accomplish the goal of fostering strong leadership to enhance environmental health services.

**Objective III-A: Provide guidance, training, and assistance to state, territorial, and local health departments, tribal governments, and other stakeholders to specifically build and enhance leadership capabilities.**

Activity III-A-1: Support national conferences, including videoconferences, to introduce CDC's environmental health strategy to its stakeholders.

Activity III-A-2: Promote the use of CDC's Internet-based Environmental Health List-Serv.*

Activity III-A-3: Develop environmental health services guidance documents and recommendations and disseminate to stakeholders.

Activity III-A-4: Develop an Environmental Health Services Corps or a fellowship program to increase the number of highly trained professionals in the field of environmental health services.

*The Environmental Health List-Serv is an Internet-based information sharing system. Any person with an interest in environmental health services can join and interact. The list-serv instructions address is www.dev.nceh.cdc.gov/ehs/Listserv/listserv.htm

# GOAL IV: COMMUNICATE AND MARKET

Improve communication and information sharing among environmental health agencies, communities, strategic partners, and other stakeholders and better market environmental health services to policymakers and the public

New and emerging environmental hazards and threats and the growing complexity of related diseases have heightened public awareness of environmental issues. Unfortunately, many people are unaware of (1) the federal, tribal, territorial, state and local programs that provide environmental health services or (2) how to access these services. Many people do not understand the role that environmental health professionals play in public health, and media coverage often fails to reinforce environmental health priorities. Not surprisingly, a NACCHO study on the concerns of environmental health practitioners concluded that major improvements in contemporary environmental health can only be achieved through improved communications and marketing.[21]

As environmental health services expand priorities from regulation to include more comprehensive programs, i.e., lead poisoning, asthma, mold exposure, hazardous waste, "prevention, rather than curative efforts have been emphasized." [10] Environmental health practitioners list as their most important activities prevention communication, including education; media and public outreach; and marketing.[21] Traditional environmental health problems and issues pertaining to water quality, food safety, indoor-air quality, and toxic waste remain important. Increasingly, the acknowledged solution to these problems is public education. "Environmental health workers are confronted with the need to educate the people they are trying to protect."[18] Contemporary environmental health educational priorities range from the need to teach the public about the safe use of household pesticides to training food service personnel, to educating future environmental health professionals.

One of the great challenges in educating the public is to overcome their lack of information about environmental risks. Noting the discrepancy between public understanding of health risks and actual probabilities, Larry Gordon, former president of the American Public Health Association,

"We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers–people able to put together the right information at the right time, think critically about it, and make important choices wisely."
*– Professor Edward O. Wilson*

identified individual community risk assessment as one of 13 challenges to improve the environment for the next century.[22] The National Environmental Health Association identifies both communication training and risk communication as being important competencies for environmental health professionals.[23]

Another major communication challenge is to help make the public and decision-makers aware that the environmental health components of public health agencies are performing their jobs. As one participant in the NACCHO study stated:

> A successful EH program becomes invisible. If they do their job right, nobody takes notice. As a result, it's hard to gain support for more resources. The public only knows you're there when you are not doing your job well. When things are going well, policy makers think: "Well they don't need all that money, there are no public health problems there." If the budget is cut, then the public health problems result.[18]

Environmental health units have tried various means to gain recognition by marketing their efforts. According to the NACCHO study, the media often have created negative perceptions of environmental health agencies and activities. News outlets set the public agenda, focusing audience attention to some issues over others. Reporters ignore many environmental health priorities that address prevalent problems and routine protection programs. Instead, journalists often highlight unique, singular, and dramatic negative outcomes of environmental hazards.[24] As a result, reporters generally ignore environmental health's most important work. Nevertheless, the media have the potential to facilitate positive images of environmental health agencies and programs. Increased communication and marketing training for environmental health practitioners is an important step in using the power of media to improve environmental health.

The goal of environmental health outreach, be it through marketing or the news media, is to give the public information so that people can make informed decisions. With information and resources, communities can play a role in protecting their environment and health. A prime example of community involvement and ownership of their environmental health issues is Delaware County, a central Ohio community of nearly 100,000 people.[38] Members of the community served on the PACE-EH committee (see box 3) and defined the final environmental issues that the health department would focus on and collect data on quality of life changes.

Community engagement should be a critical mission of environmental health agencies. Participants in the NACCHO study listed "enhanced communication and work with local communities"[18] as the most important facilitating element leading to improved environmental health. However, local involvement in environmental health requires more than one-way communication. The National Research Council (NRC) concluded

that involving community members at each step of risk assessment and management was necessary for ethical practice in public health.[25] The NRC explains that individuals want a role in identifying environmental priorities in their communities. Often residents don't feel they have input in the process of identifying the problems and solutions that affect them. Involving the community requires a system that includes opportunities for community members to discuss their concerns and ideas with environmental health professionals. Agency staff must listen to and understand individual and community concerns and use the liaison capabilities of the members of their board of health.

Increased appreciation for cultural differences was listed as the second most important facilitating element for improved environmental health in the NACCHO study. There are several examples which illustrate this issue. In New York City, adults with toxic blood levels of lead were reported, and when investigated by the environmental health unit, it was revealed that all of the adults were Asian who received "teas" medications from a local herbalist. Many of the people with the elevated blood levels refused to deal with the health department. Further investigation by the environmental health unit revealed that the herbs came from Shanghai, China. Working together the Shanghai and New York environmental health units found that the herbs were dried in warehouses using car engine exhaust, containing leaded gasoline. Involvement of Chinese speaking personnel from the New York Department of Health persuaded many reluctant people to seek treatment for their lead poisoning.[39] We need to recognize and be able to deal with the cultural differences within communities. Solutions to environmental health problems often fail if they don't address the unique needs, beliefs, and practices of communities. An excellent tool to tackle this problem is the *Protocol for Assessing Community Excellence in Environmental Health (PACE-EH)*.[26] *PACE-EH* fosters collaboration among public health agencies and their communities so that they work together to assess the environmental health needs of the community.

Improved internal communication within the environmental health service community is a necessity. Informational barriers among environmental health professionals, especially in different agencies, have long plagued public health by preventing the rapid sharing of outbreak and exposure information. Local agencies that seek resources for testing, training, or information often do not know where to go or cannot access centralized databases or resources. Too often information does not flow smoothly from federal agencies to state and local professionals and vice versa. Information about successful programs in one state is not routinely shared with other states because of a lack of centralized information systems. As noted in the *Future of Public Health*:

> The infrastructure of environmental health and protection is huge and complex, having evolved from public health agencies to multiple emerging environmental regulatory agencies. The consequences are fragmented responsibility, lack of coordination, and inadequate attention to the public health dimensions of environmental health issues.[4]

Communication to create links within the environmental health community and between environmental health and other public health agencies is necessary to improve public health. Federal, state, territorial, and local environmental health service agencies, including tribal governments, need to establish a dialogue in which priorities can be established and information shared to identify and prevent exposure and related diseases. In addition, environmental health services

stakeholders, especially at the community level, need to know how to access training opportunities so that they can raise their competency levels. All of this requires an improved system for communication among public health agencies, their partners, and communities.

As stated in *Marketing Public Health: Strategies to Promote Social Change,* "Although marketing principles have been applied to some efforts to change health-related behaviors for many years, their application usually is restricted to initiatives that focus on the behavior of individuals and ignore the larger issues of policy changes needed to aid and support individual efforts. The integrating of marketing principles into day-to-day public health practice is a new concept and one that has not yet been fully developed. These principles can provide powerful tools for influencing all of the factors that contribute to social change: the individual, the environment, and social policy." [26]

Following are the objectives and their corresponding activities to accomplish the goal of improving communication and information sharing among environmental health agencies, communities, and other stakeholders.

**Objective IV-A: Identify and promote community-based strategies to elevate the image, importance, and need to improve environmental health services.**

Activity IV-A-1: Sponsor, support, and participate in national, regional, state, and local conferences and meetings pertaining to environmental health services.

Activity IV-A-2: Engage national agencies and organizations in developing strategies and materials to educate the public policy makers and others on environmental health issues.

Activity IV-A-3: Support the development and use of guidance documents to promote effective environmental health services (e.g., the *Protocol for Assessing Community Excellence in Environmental Health [PACE-EH]*).[5]

**Objective IV-B: Support educational approaches and models of best practices to gain community support and participation in addressing environmental health service issues, concerns, and best models to organize, deliver, and market environmental health services.**

Activity IV-B-1: Support activities and projects that demonstrate effective methods for interacting with environmental health stakeholders.

Activity IV-B-2: Recommend and disseminate the best environmental health service models to engage and empower local communities.

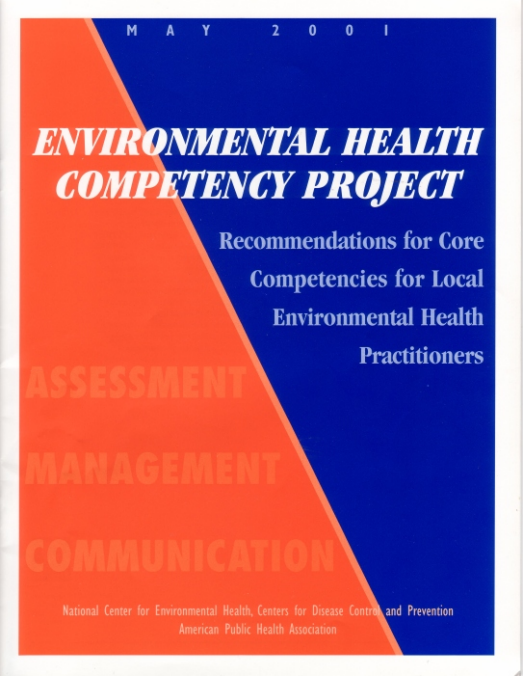
Activity IV-B-3: Support activities that demonstrate effective methods for marketing environmental health services to policymakers and the public.

# GOAL V: DEVELOP THE WORK FORCE

Promote the development of a competent and effective environmental health service work force

In *Healthy People 2010*,[7] the Department of Health and Human Services presented 17 public health infrastructure objectives, three of which were specifically directed to developing the public health work force. The report states "In addition to basic knowledge of public health, all public health workers should have competencies in their areas of specialty, interest, and responsibility....The work force needs to know how to use information technology effectively for networking, communication, and access to information. A skilled work force must be culturally and linguistically competent to understand the needs of and deliver services to select populations and to have sensitivity to diverse populations....Technical competency in such areas as biostatistics, environmental and occupational health, the social and behavioral aspects of health and disease, and the practice of prevention should be developed in the work force."


There is ample evidence that the size of the environmental health work force is unable to meet its responsibilities. The *Public Health Workforce: Enumeration 2000* report states "The public health work force in this current best estimate is composed of 448,254 persons supplemented by at least 2,864,825 volunteers." [27] In addition, "It may come as a surprise that the current estimated number of public health workers is less than the oft-cited half-million number developed in the 1970s. At the time that number was developed, it represented a public health worker population ratio of one worker to each 457 persons, a ratio noticeably better than the current estimate of one worker for every 635 persons. Given the new public health challenges of the intervening decades, the change represents a substantial erosion in public health capacity." [27] The report states that it underestimated the size of the environmental health work force because "there are at least 41 state environmental agencies responsible for environmental health and protection programs, a number that far exceeds the number of environmental agencies included in data received for this report." [27] The report estimates the environmental health work force to be 10% of the total public health work force. Other reports have enumerated the environmental health work force at 16-21% of the total.[36] In addition, 46 different job classifications that provide environmental services have been defined.[28] Thus, as described in the report "only 19,431 (out of 448,254) environmental health professionals could be identified. This is likely due to the fact that many environmental health activities are organizationally separated from other parts of public health." [27] The inadequate size of the environmental health work force can be traced to the increase in suburban populations and the consequent increase in the number of new homes requiring septic system inspections and approvals, and the explosion in the number of food establishments requiring inspection and monitoring.




The environmental health work force is engaged in a broad array of jobs. As stated by Larry Gordon, former president of the American Public Health Association (APHA), "Environmental health practitioners are involved not only in inspections, but perhaps more importantly in surveillance, warnings, permitting, grading, developing compliance schedules and variances, risk assessment, risk communication, public information, exposure evaluation, seeking injunctions and other legal remedies, embargoing, sampling for analyses, education, consultation, community networking, public information, problem prioritization, policy development, marketing the values and benefits of environmental health, plan and design review and approval, and epidemiology. Such activities are essential to a modern, effective program." [29]

There are no special education or certification requirements to enter the environmental health work force. Generally, a college degree is the stated minimal requirement, with many local health departments hiring personnel with a high-school diploma. There is no formal set of competencies that define performance or direct training approaches. The new worker learns by observation of experienced environmental health professionals. As public health departments take on more environmental issues, rapid turnover of staff frequently occurs. Low pay scales in the public sector often contribute to the problem.

### Box 7 - Environmental Health Competency Project

Recommendations for Core Competencies for Local Environmental Health Practitioners

May 2001

Prepared by: American Public Health Association and the National Center for Environmental Health, Centers for Disease Control and Prevention

Fourteen core competencies for environmental health practitioners are presented below, based on the work done by the expert panel at its February meeting and by subsequent revisions and comments that the panel made. The competencies are grouped into the three primary functions of an environmental health program.

A. Assessment
- Information gathering
- Data analysis
- Evaluation

B. Management
- Problem solving
- Economic and political issues
- Organizational knowledge and behavior
- Project management
- Computer and information technology
- Reporting, documentation, and record-keeping
- Collaboration

C. Communication
- Education
- Communication
- Conflict resolution
- Marketing

NOTE: Discussion about cultural sensitivity as a competency was extensive. All participants thought cultural sensitivity was important, and although not an explicit competency, cultural sensitivity was considered to be part of all that is done in environmental health and protection. Cultural sensitivity includes, but is not limited to, understanding the dynamics of cultural diversity (race, ethnicity, and socioeconomics), linking with other disciplines inside and outside the agency to enhance the receptivity of the workplace to a multicultural environment, acting with sensitivity and understanding, and developing and adapting approaches to problems that take into account cultural differences.

The Robert Wood Johnson Foundation undertook an analysis of the training needs for the public health work force. Their report[10] describes the need for environmental health practitioners to improve their current knowledge and skills to competently perform the essential services of environmental health and protection. The list of needed skills required for communication, technical, management, knowledge, and cross-cultural competencies represents an excellent basis for defining environmental health competencies and translating them into training modalities. Competencies are the skills, behaviors, and actions required to perform a function. The National Environmental Health Association has prepared two sets of competencies[23] and the APHA, in conjunction with CDC, also has prepared a set of environmental health competencies[30] (see Box 7).

Of historical interest is the *Seventh Report to the President and Congress on the Status of Health Personnel in the United States*.[31] It stated that in 1980, 37,500 of an environmental health work force of 235,000 needed additional training in public health. It also forecast a need for an additional 137,000 environmental health professionals. Accredited environmental programs are designed to provide their graduates with a foundation in environmental sciences and public health while developing their critical thinking skills. Currently, only 23 such undergraduate programs are accredited by the National Environmental Health Science and Protection Accreditation Council, (NESHPAC). There would probably be more environmental health programs in colleges if students demanded them, but without adequate workplace compensation very few students want to enter the field. Clearly, these programs alone cannot meet the demand for the environmental health and protection work force needed to address the issues described above. As the *Report to the President and Congress* stated:

> The potential consequences of such an inadequately trained and understaffed work force is worrisome. Few national resources are committed to preparing future environmental health and protection professionals; training opportunities for members of the existing work force are limited; and opportunities for local workers to upgrade their environmental health knowledge are not readily available. Thus, we need to focus on increasing the number of graduates from accredited programs in environmental health as well as on increasing the training opportunities available to current environmental health professionals, particularly at the local level.[31]

In 1996, only 18 states required formal registration of environmental health specialists or sanitarians. Sixteen states had no registration, and 16 others had only voluntary registration. The standards often are minimal. Many states do not require a degree to practice in the field of environmental health. If the work force in the field of environmental health is to be truly effective, minimum competency levels must be defined, and individuals who practice in this field must be encouraged or perhaps required to meet those levels. Well-

trained, competent professionals would more likely be recognized as local authorities and leaders in public health.

Much work has been accomplished with limited resources in defining competencies, creating an Internet-based training registration system, and funding 14 "Centers for Public Health Preparedness,"(7 academic centers, 4 specialty centers, and 3 advanced practice centers) schools of public health and local health department-based training centers. [51] In May 2001, CDC and the Agency for Toxic Substances and Disease Registry, together with partners from the public health practice and academic communities, produced a global work force development plan[32] that envisions the following continuum: monitoring work force composition, identifying competencies and developing curriculum, designing integrated learning systems, using incentives to assure competency, conducting evaluation and research, and ensuring financial support.

Both Frist-Kennedy bills, the Public Health Threats and Emergencies Act of 2000 (P.L. 106-505) and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (P.L. 107-188) focus on bioterrorism and new and emerging infections. In addition the Public Health Threats and Emergencies Act of 2000, Section 101, places strong emphasis on improving core health capacity within the public health system. The laws have broad support, especially with the current focus on public health preparedness and response capability. These laws will hopefully add critically needed resources for training and core public health capacity building.

An editorial in the *Journal of the American Medical Association* states "There has probably never been a time in the history of this country, when trained, competent, and efficient health officers were needed as much as they are now. It is unfortunate that in the absence of epidemics too little attention is paid to those whose duties require them to guard the public health." [33] This editorial was published in 1893.

"The conventional definition of management is getting work done through people, but real management is developing people through work."

*–Agha Hasan Abedi*

Following is the objective and its corresponding activities to accomplish the goal of promoting the development of a competent and effective environmental health services workforce.

**Objective V-A: Provide support to develop the environmental health service work force via enumeration, performance standards, training, recruitment and retention activities.**

Activity V-A-1: Enumerate the environmental health service work force.

Activity V-A-2: Define a set of environmental health services performance standards.

Activity V-A-3: Define the training and continuing education needs of the environmental health service work force.

Activity V-A-4: Expand efforts to improve the recruitment and retention of competent and effective practitioners in the field of environmental health services, with special emphasis on the recruitment and retention of minorities.

# GOAL VI: CREATE STRATEGIC PARTNERSHIPS

Foster interactions among agencies, organizations, and interests that influence environmental health services

Interactions among environmental health professionals, agencies, and organizations can range from networking to communicating to collaborating to partnering. Networking is the sharing of information – the classic examples being people searching for leads in the midst of a job search or informing others about their activities. Communication elevates the level of information sharing, where people or organizations discuss their mutual activities and define how those activities can aid each other. Collaboration involves an agreement among individuals or entities to modify their activities to work together towards a common goal. An example is a housing department of a mayor's office collaborating with an environmental unit of the health department to work together to ensure safe housing for people at risk of losing their apartments or homes and becoming homeless. Still another level of interaction is a partnership whereby those interacting agree to modify their resource utilization to achieve a common goal. Such a partnership could involve two agencies sharing or contributing resources through a formal agreement to achieve a common goal. An excellent example of this comes from Columbus, Ohio, where a partnership was established between the Mayor's Office of Housing and the Departments of Health, Fire, Police, and Sanitation utilizing community outreach workers to relocate at-risk individuals and families who live in inadequate or condemned housing. Formal and informal interactions among agencies and organizations are essential to improving environmental health services. No single agency or organization alone can do the job.

In speaking about public health, Siegel and Doner[26] stated "Working with organizations is an important part of most social change efforts. Building and maintaining effective relationships with other organizations often is critical to achieving desired outcomes. 'Partners' can include cosponsors of programs, the media, and a variety of intermediaries that are used to reach target audiences." They further stated, "Partners are often necessary to successfully bring about change. They can provide additional resources, additional reach to audience members, greater credibility with their constituencies, and expertise that your organization does not possess…but building strong partnerships takes time and involves compromise."

*"Working with organizations is an important part of most social change efforts. Building and maintaining effective relationships with other organizations often is critical to achieving desired outcomes. 'Partners' can include cosponsors of programs, the media, and a variety of intermediaries that are used to reach target audiences."*

*–Siegel and Doner*

The National Association of County and City Health Officials and its partners have produced a tool – Mobilizing for Action Through Planning and Partnership (MAPP).[34] MAPP is a process that enables communities to organize and develop partnerships. By using MAPP, communities can accomplish four strategic assessments focused on community themes, local public health system assessment, community health assessment, and evaluation of the forces of change. Environmental health issues are one of the critical parameters in MAPP.

Environmental health professionals also must recognize that the communities they serve are critical partners. The *Protocol for Assessing Community Excellence in Environmental Health (PACE-EH)*[5] is a tool to assist public health agencies and the communities they serve to collaborate to assess environmental health needs and to develop strategies to address them. An example of community involvement and ownership has been reported from Delaware County, Ohio.[38] The community members of the PACE-EH committee were instrumental in defining the first set of issues and then worked with the health department committee members to define the high priority issues that would be the focus of health department and community efforts.

The need to build and expand strategic partnerships to enhance and improve environmental health services remains significant, especially as it relates to legislative and policy-making groups, boards of health, governing bodies of local jurisdictions, land-use planning boards and organizations, and the media.

Following is the objective and its corresponding activities to accomplish the goal of fostering interactions among agencies, organizations, and interests that influence environmental health services.

**Objective VI-A: Coordinate and promote activities that identify critical stakeholders, and foster communications and interactions among agencies, organizations, and interests that influence environmental health services.**

Activity VI-A-1: Identify stakeholders who influence all components of the environment (built and natural) that have an impact on environmental health services.

Activity VI-A-2: Support activities (e.g., conferences, meetings, seminars, etc.) that influence stakeholders to work together to improve environmental health.

Activity VI-A-3: Develop mechanisms for regular communication and coordination among stakeholders.

# ANTICIPATED OUTCOMES

The overarching goal of this strategy is to enhance and revitalize environmental health services to address the broad range of environmental health issues facing the nation. Implementation of this strategy will help revitalize environmental health services at all levels of government, academia, and the private sector. Such revitalization could greatly motivate talented people to enter the field, which is the second largest component of the public health work force. Improving the environmental health services practitioner's access to technology and other innovative tools should also increase the ability to achieve the goals, objectives and activities of this strategy. The outcome will be a stronger, more flexible environmental health services work force that has a solid infrastructure, and that is well prepared to respond to environmental health issues and to address the unexpected.

Specific anticipated outcomes from implementation of this strategy are as follows:

- A significant increase in environmental health services capacity at the state, tribal, territorial, and local levels
- Improved drinking water safety from an improved understanding of how to protect un-regulated or under-regulated water supplies
- An enhanced ability of the environmental health services work force to address existing and emerging needs and to identify environmental antecedents of disease outbreaks
- An enhanced ability of state, tribal, territorial, and local programs to anticipate, recognize, and respond to environmental threats
- An emphasis on the prevention aspect of environmental health services
- More effective use of data analysis by front-line environmental health practitioners to respond to the occurrence of environmental related illness
- Stronger working relationships among the stakeholders in environmental health services
- Implementation of more effective public health programs as a result of effective involvement of the affected communities
- Empowerment among communities engaged in environmental health issues
- A better understanding of the scope of work, size, composition, performance standards, and competencies of the environmental health work force and its leadership
- An increase in the number of environmental health practitioners who engage in competency-driven continuing education and training
- The creation of National Environmental Health Services Corps or fellowship program comprising well-trained specialists destined to become leaders in environmental health services delivery
- The development of an Environmental Health Leadership Institute that educates mid-career environmental health managers regarding best practices

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# LIST OF BOXES

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# ACRONYMS

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|---|---|
| **ASTHO** | **Association of State and Territorial Health Officials** |
| **ATSDR** | **Agency for Toxic Substances and Disease Registry** |
| **CDC** | **Centers for Disease Control and Prevention** |
| **EEHS** | **Emergency and Environmental Health Services** |
| **EH** | **Environmental health** |
| **EPA** | **U.S. Environmental Protection Agency** |
| **HHS** | **Health and Human Services** |
| **IOM** | **Institute of Medicine** |
| **MAPP** | **Mobilizing for Action through Planning and Partnership** |
| **NACCHO** | **National Association of County and City Health Officials** |
| **NALBOH** | **National Association of Local Boards of Health** |
| **NEHA** | **National Environmental Health Association** |
| **NRC** | **National Research Council** |
| **PACE-EH** | **Protocol for Assessing Community Excellence in Environmental Health** |
| **TASWER** | **Tribal Association of Solid Waste and Emergency Response** |

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# GLOSSARY

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| **Animal control** | An activity to prevent the transmission of zoonotic diseases and injury caused by animals and then bites, alleviate animal nuisances, and enforce animal control or ordnance. |
| **Antecedents** | A precursor; something that comes before something else. |
| **Assessment** | One of the three core functions. It is composed of monitoring, diagnosis, and investigation. The "science" of public health. |
| **Assurance** | One of the three core functions. It is composed of enforcement, guaranteeing the delivery of health services, and evaluation. The "art" of public health. |
| **Biomonitoring** | Testing of the environment or people for biological agent exposure. |
| **Built and natural environment** | The total environment. |
| ***Campylobacter*** | Gram-negative, spirally curved, rod-shaped bacterium; family *Spirillaceae.* |
| **Capacity building** | The building of infrastructure systems, work force, and fiscal. |
| **Commensal** | Different species that live in an intimate, nonparasitic relationship. |
| **Competencies** | The set of skills, behaviors, and actions necessary to perform a job. |
| **Core Public Health Functions** | The document produced by the National Association of County and City Health Officials that lays out the three core functions (assessment, assurance, and policy development) and the essential public health services. |
| ***Cryptosporidium*** | An intestinal coccidian protozoa that can be found in drinking water; causes diarrhea. |
| ***E. coli* O157:H7** | A gram-negative colon bacillus; O157:H7 is enterohemorrhagic. |
| **Environmental health** | The art and science of protecting against environmental factors that may adversely affect human health or the ecological balances essential to long-term human health and environmental quality. Such factors include, but are not limited to, air; food and water contaminants; radiation; toxic chemicals; disease vectors; safety hazards and habitat alterations; According to the World Health Organization and *Healthy People 2010*, "environmental health comprises those aspects of human health, disease, and injury that are determined or influenced by factors in the environment."[6] |
| **Environmental protection quality** | The set of activities that are controlled by regulation, such as air and water safety. |

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| **Essential health services** | The set of 10 public health agency services that are deemed the critical activities of public health. Also includes research and systems management. |
| **Frist-Kennedy bill** | A public health infrastructure development bill. Is now the Public Health Threats and Emergencies Act of 2000. Public Law 106-505, Section 101. |
| ***The Future of Public Health*** | Document produced by the Institute of Medicine in 1987 that reviewed the poor status of public health in the United States and defined what needed to be accomplished to improve the system. |
| **Global threats** | Threats to the environment and people that transcend borders, e.g., global warming, terrorism. |
| **Hantaviruses** | Viruses of the family *Bunyaviridae*; can cause hemorrhagic fever with renal syndrome and hantavirus pulmonary syndrome. |
| ***Healthy People 2010*** | The set of health objectives to be accomplished by the year 2010 that is promulgated by the Department of Health and Human Services. The theme is to eliminate the gaps in health status among racial and ethnic groups. |
| **Lyme disease** | A form of arthritis caused by a tick-transmitted spirochete. |
| **Mobilizing for Action Through Planning and Partnership (MAPP)** | A process developed under the auspices of the National Association of County and City Health Officials to better the health of the community. |
| **Pew report** | *America's Environmental Health Gap*, produced under the auspices of the Pew Environmental Health Commission. |
| ***Pfiesteria piscicida*** | A marine microorganism that releases a toxin which can cause massive fish kills. |
| **Policy development** | One of the three core functions. It is composed of education, mobilization, and development of plans. The "politics" of public health. |
| **Prevention communication** | Messages to the public on how to reduce risk of adverse health effects from exposure to disease-causing agents and chemicals. |
| ***Protocol for Assessing Community Excellence in Environmental Health*** | A community-based process for evaluating and prioritizing environmental issues facing a neighborhood. |
| **Public health** | Those things we do to maintain good health and a healthy environment. |

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| **Risk assessment** | A system to evaluate the potential or actual exposure to a biological or environmental agent. |
| **Shared system** | Where more than one entity is responsible for a set of activities; usually shared between a state and local health department. |
| **Stakeholders** | Any person or organization that has an interest in a system. |
| **Stovepipe** | Refers to programs that work in isolation and don't share information or resources with other programs. |
| **Strategic partnership** | The close-working system among affected organizations to ensure the success of an endeavor. |
| **Systems management** | A scheme for operating an organization with a set of rules and precepts. |
| **Terrorism** | A catch-all phrase that includes all forms of terrorism: biological, electronic (computer network destruction), nuclear, incendiary, chemical, explosive and radiation. |
| **Urban sprawl** | The growth of urban populations to several large suburban areas. |
| **Vector** | A carrier (usually an insect, arthropod, or rodent) that transmits the causative organism of disease. |
| ***Vibrio Cholerae*** | Gram-negative rod, produces an enterotoxin, causing a severe diarrheal disease (cholera). |
| **West Nile virus** | A virus that is transmitted by mosquito and causes encephalitis. Mosquito acquires the virus from birds and can transmit to animals (horse) and people. |
| **Yellow Fever** | An acute infectious viral disease. Can be caused by mosquito or primate bite. |

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